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Effect of resonant acoustic mixing on pharmaceutical powder blends and tablets

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ABSTRACT

The blending performance in a resonant acoustic mixer (RAM) was characterized. The system showed to be highly effective in blending low concentrations of cohesive active pharmaceutical ingredients (APIs) and lubricants. A summary of these results will be described and changes in material properties were observed. Those changes, and their effects on tablet characteristics, were also studied. Changes in particle size, powder flow properties, and hydrophobicity of the blend were investigated. Tablets were then compressed, using a tablet press simulator, and characterized. The tableting compression force, tablet hardness, tablet weight, and tablet dissolution were considered. Results indicated that the powder blend material properties and tablet characteristics were significantly affected by acceleration (mixing intensity), blending time, and thus, total energy input. The RAM was shown to be an excellent choice for blending low concentrations of cohesive APIs, but care must be taken when blending hydrophobic lubricants because the high-energy input can adversely affect the final tablet properties such as hardness and dissolution. In addition, the material properties of the blends and tablets were correlated to the total energy input. These correlations demonstrated that total energy, in the RAM, determines, and can be used to predict, the performance of final blends and finished product.